Spencer (J. W.) Ancient Shores, Boulder Pavements, and High-Level Gravel Deposits in the Region of the Great Lakes. 8vo. [*New York*] 1889. The Author.

Stopes (H.) Indications of Retrogression in Pre-historic Civilization in the Thames. 4to. *Leeds* 1890. The Author.

Vernon-Harcourt (L. F.) The Physical Conditions affecting Tidal Rivers; and the Principles applicable to their Improvement. Folio. [*Manchester*] 1890. With French translation of the same. The Author.

December 1, 1890.

ANNIVERSARY MEETING.

Sir G. GABRIEL STOKES, Bart., President, in the Chair.

The Report of the Auditors of the Treasurer's Accounts, on the part of the Society, was presented, by which it appears that the total receipts, including balances carried from the preceding year, amounted to £7,665 9*s.* 10*d.* on the General Account, and £7,016 11*s.* 7*d.* on account of Trust Funds, and that the total expenditure in the same period amounted to £5,886 1*s.* 11*d.* on the General Account, and £4,457 7*s.* 8*d.* on account of Trust Funds, leaving a balance on the General Account of £1,753 9*s.* 5*d.* at the bankers', and £25 18*s.* 6*d.* in the hands of the Treasurer, and, on account of Trust Funds, a balance at the bankers' of £2,559 3*s.* 11*d.*

The thanks of the Society were voted to the Treasurer and Auditors.

The Secretary then read the following Lists :—

Fellows deceased since the last Anniversary (Nov. 30, 1889).

On the Home List.

Beckles, Samuel Husbands, F.G.S.
Burt, T. Seymour, Maj., M.R.A.S.
Davis, Sir John Francis, Bart.
Duncan, James Matthews, M.D.
Ellis, Alexander John, B.A.
Fischer, William Lewis Ferdinand, M.A.
Gull, Sir William Withey, Bart., M.D.
Hood, Charles, F.R.A.S.
Jones, Charles Handfield, M.B.
Kane, Sir Robert, M.R.I.A.
Lefroy, Sir John Henry, General R.A.
Mylne, Robert William, F.R.S.E.
Napier of Magdala, Robert, Lord, G.C.B.
Parker, William Kitchen, F.Z.S.
Perry, Rev. Stephen Joseph, F.R.A.S.
Smyth, Sir Warington Wilkinson, F.G.S.
Talbot, Christopher Rice Mansel.

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On the Foreign List.

Rosenberger, Otto August.

Defaulter.

Twiss, Sir Travers, Knt., Q.C.

Change of Name and Title.

Macdonald, Right Hon. John Hay Athole, *to* Lord Kingsburgh.

Fellows elected since the last Anniversary.

Baker, Sir Benjamin, M.Inst.C.E.
Bosanquet, Robert Holford Macdowall, M.A.
Burbury, Samuel Hawkesley, M.A.
Gardiner, Walter, M.A.
Kerr, John, LL.D.
Lea, Arthur Sheridan, D.Sc.
MacMahon, Percy Alexander, Major R.A.
Norman, Rev. Alfred Merle, M.A.
Perkin, Professor William Henry, F.C.S.
Pickering, Professor Spencer Umfreville, M.A.
Roberts, Isaac, F.R.A.S.
Sharp, David, M.B.
Teall, J. J. Harris, M.A.
Thorne, Richard Thorne, M.B.
Weldon, Walter Frank Raphael, M.A.

On the Foreign List.

Cannizzaro, Stanislao.
Chauveau, Jean Baptiste Auguste.
Rowland, Henry A.

The President then addressed the Society as follows:—

The proceedings of every Anniversary Meeting remind us of the losses which the Society has sustained during the preceding year by the deaths of several of its Fellows. Of those whom we have lost during the past year, some were distinguished for their scientific labours, some were well known in the world at large. Of several, full obituary notices have appeared or will appear in the 'Proceedings,' but it will, I think, be in accordance with the wishes of the Fellows that I should say a few words on the present occasion about some of those whom we have lost.

The Rev. Stephen J. Perry, S.J., whose name is well known in connexion with his accurate magnetic observations, and his labours in the domain of solar physics, was last year elected a member of the Council. It was known that he could not attend the first meeting, as he would be on his way to the West Indies to observe the total solar eclipse of the 22nd of December, but we looked forward

to having him at the meetings of our Council after that was over. In this we were doomed to disappointment, for a telegram which arrived shortly after the day of the eclipse brought the sad intelligence of his death. His illness began shortly before the day of the eclipse, but he did not suffer it to interrupt his preparations, but worked on to the end as far as his failing strength would allow. The observation of total solar eclipses was a branch of solar physics to which he had paid special attention, and, considering the circumstances of his death, we may regard him as a martyr to science, while at the same time his kindly disposition ensured attachment from all who knew him.

William Lewis Ferdinand Fischer, who was a friend of mine for more than forty years, was a German by birth, and was educated in Germany. He came to Cambridge later in life than most men commence residence, entering at my own college, Pembroke. At the time when he entered he was only imperfectly acquainted with the English language. He took his degree in due course, having come out fourth wrangler. He obtained a fellowship at Clare College, and, after some time, was elected Professor of Natural Philosophy in the University of St. Andrews, at which town he continued to reside till his death, and where his widow still resides. He was remarkably well acquainted with what had been done in physical science.

In the middle of January we lost, in Lord Napier of Magdala, a man of world-wide reputation, who had been a Fellow of the Society for more than twenty-three years. A sketch of his life has already appeared in the 'Proceedings.'

The eminent physician Sir William Gull, who for some considerable time had been in failing health, was taken from us at the beginning of this year. The Fellows have already in their hands a sketch of his life.

In February there died, at an advanced age, our Fellow Sir Robert Kane, who was eminent among what we may regard as the last generation of chemists. A biographical notice of him is already in the hands of the Fellows.

Robert William Mylne, who died in July, was for thirty years a Fellow of the Society, to which also both his father and grandfather belonged. He was twelfth in direct descent of a family of architects and engineers, his direct ancestor having had the erection of new buildings for Holyrood Palace in the reign of Charles the Second. He was himself a hydraulic engineer, and was frequently consulted as to water supply, both by the Government and by private companies. He was perhaps best known in the department of geology, and his geological map of London and the neighbourhood, a work of immense labour and expense, was long a standard authority among scientific men.

General Sir John Henry Lefroy, who died last April, combined the duties of his profession and of his responsible offices as Governor of Bermuda, and, for a time, of Tasmania, with active scientific work in relation especially to terrestrial magnetism, with which he was connected by his post as director of magnetic observatories at St. Helena and at Toronto. He is the author of a treatise on the subject, and has entered into some investigations bearing on a possible cause of local magnetic irregularities, which seem well deserving of consideration.

Sir Warington Wilkinson Smyth, who was so high an authority on all that relates to mining, and geology as bearing upon it, was one of our Fellows who repeatedly served on our Council and on various committees, and by his sound judgment aided us in our deliberations. Though his health had been failing for some time, his end came upon us with startling suddenness. It will be remembered by many of the Fellows that he was present at our conversazione on the 18th of June, and next morning he breathed his last. He was widely known as a man of science, and was honorary Fellow of various societies on the Continent. In him I have lost one who was formerly a colleague of my own as lecturer in the School of Mines.

William Kitchen Parker held a very high place among biologists in relation especially to the homologies of the vertebrate skeleton. Notwithstanding the laborious nature of his profession, he managed to find time for his scientific pursuits, and our 'Transactions' contain a large number of papers which came from his pen, and are illustrated by elaborate drawings. So highly were his biological researches thought of, that for several years means were found, through an application of a portion of the Government Grant, for enabling him to dispense with the laborious work of his profession, and devote himself to science. His genial disposition and vivacity of manner, and, curiously enough, his personal appearance, reminded one of Faraday.

Dr. James Matthews Duncan, who died suddenly from heart disease, was eminent as an obstetric physician, and was a man of singular straightforwardness of character.

Our Fellow Charles Handfield Jones died on the 30th of September. His chief scientific labours lay in the domain of pathological anatomy.

Alexander John Ellis, who died on October 28, devoted great attention to philology and to the theory of the perfection of musical sounds, and translated v. Helmholtz's work, "Tonempfindungen." He had, shortly before his death, received an honorary doctor's degree from the University of Cambridge.

During the last year we have lost two out of our three senior Fellows, Christopher Rice Mansel Talbot, a Fellow also of the Lin-

nean Society, who was elected our Fellow in 1831, and, still more recently, in fact only a few days ago, Sir John Francis Davis, who was elected as long ago as 1822, and died at the very advanced age of ninety-six.

The number of Fellows elected before 1847 is now reduced to twenty-three, so that in any statistical calculations of the effect of the statutes of 1847 on the number of Fellows, the present condition of the Society may be taken as practically normal.

The Committee appointed in 1888 to consider the best mode of administrating the fund, which was inaugurated in 1882, for founding a memorial to our late eminent Fellow, Charles Darwin, have now presented their report, which has been adopted by the Council. It has been decided that the proceeds of the Darwin Fund be for the present applied biennially in reward of work of acknowledged distinction (especially in biology) in the field in which Mr. Darwin himself laboured; that the award consist of a medal in silver or bronze, accompanied by a grant of £100; that it be made either to a British subject or to a foreigner, and without distinction of sex; and that the award should be conferred at the same time as other medals at the Anniversary.

It was further intended, in accordance with Mr. Darwin's known views, that, as a rule, the award should be made rather for the work of younger men in the early part of their career than as a reward to men whose scientific career is nearly finished.

The Committee appointed at a meeting of the Council held immediately before the last anniversary meeting of the Society, to set on foot a memorial of our late Fellow James Prescott Joule, have naturally not got quite so far in their work. They decided that the memorial should take an international character, and should have for its object the encouragement of research in physical science, and should also have in view the erection of some personal memorial in London. The subject was accordingly brought to the notice of a number of scientific men abroad, from many of whom favourable replies have been received. The Joule Committee have resolved, "That the balance of the fund, after providing a suitable personal memorial, be transferred to the President, Council, and Fellows of the Royal Society, and that the President and Council be requested to undertake the administration of the proceeds in such manner as may appear to them most suitable for the encouragement of research, both in England and abroad, especially among younger men, in those branches of physical science more immediately connected with Joule's work;" and, also, "That the treasurer be instructed to retain for the present a sum not exceeding £300 for the expenses of the medallion, and hand over the balance to the President, Council, and Fellows of the Royal Society."

This offer of the Joule Committee was accepted with thanks by the Council, but the further consideration of the steps to be taken has not yet been entered on. Meanwhile the treasurer of the fund has handed over to the treasurer of the Royal Society a sum of about £1,400.

In 1663, when the second charter was granted to the Society, a body of statutes was drawn up for regulating various matters not fixed by charter. Alterations have since been made from time to time, as provided for in the statutes themselves. The last considerable alteration was made in 1847, when the present system was introduced, according to which the Council select from the candidates, other than those who have a special privilege as to coming on for ballot, a definite number whom they recommend to the Society for election, and the election takes place on one definite day in the year. A few changes, of less importance, have been made since that time, and experience has pointed out the desirability of some changes of detail, chiefly as regards the mode of dealing with papers. A committee was appointed last session, and continued at the commencement of the present, to revise the whole body of statutes, with a view to bring them into stricter conformity with existing practice, and at the same time to propose further changes, should any such appear desirable. The Committee have now reported; but as the session was near its end, and the subject was one requiring full consideration by the Council, the report has been merely received and entered on the minutes, and it has been left to the Council that is to be elected to-day to take such further steps as may appear to them desirable.

Some of the proposed alterations relate to the mode of dealing with papers which are communicated to the Society, which is a matter of practical business that may well be left to the judgment and experience of the executive body. But some points have been raised which it seems desirable to bring to the notice of the Fellows at large, in order that they may have an opportunity of considering them before a final decision is come to by the new Council.

The question has more than once been raised whether, considering the increase of population and the more general diffusion of scientific knowledge which has taken place within the last forty years, the number of candidates to be selected by the Council for recommendation to the Fellows for election might not now, with advantage, be made a little larger than fifteen, the number at which it was fixed in 1847. On this question there was considerable difference of opinion in the Committee, but the majority were in favour of keeping the number as it is at present.

Connected, to a slight extent, with this question is another, whether the Council should not have the power of recommending to the Fellows for election, in addition to the fifteen selected from among

the candidates on the ground of scientific merit, a strictly limited number of men of very high eminence in other ways. The Committee recommend that such a power be entrusted to the Council, the number of Fellows who have been thus elected, existing at any time, being limited to a maximum of twenty-five, and the number elected in any year to a maximum of two.

The question was also discussed whether the maximum number of foreign members, which at present stands at fifty, should be increased, and was decided in the negative.

Another recommendation of the Committee which, perhaps, it may be as well to mention, is one enabling the Council, in any year, to regulate for the ensuing year the length of the Christmas and Easter holidays. At present the weekly meetings are resumed in the second week after Christmas week, and there is then no intermission till Passion week, although the earlier portion at least of this interval is a time during which papers intended for reading do not usually come in so frequently as towards the end of the session. According to the statute in force till 1888, three of the ordinary weekly meetings between Whit-Sunday and the last meeting in June were cut out, by the Whitsun holiday, Ascension Day, and the annual election of Fellows; and as at that time of year papers commonly come in pretty frequently, there was a considerable congestion of papers towards the close of the session. This congestion was partially relieved by an alteration of the statutes, which came into force in 1888, enacting that an ordinary meeting should be held at the conclusion of the Annual Meeting for the election of Fellows; but the fact that the proportion between the number of meetings held and the number of papers that come in varies a good deal with the season seems to render it desirable that the regulation of the number of meetings should be rather more elastic, and should, to some extent, be left in the hands of the Council.

Since the last anniversary twenty-five memoirs have been published in the 'Philosophical Transactions,' containing a total of 1068 pages and 72 plates. Of the 'Proceedings,' eleven numbers have been issued, containing 1165 pages.

In the library, the work of making room for growing series, and of obtaining volumes or parts to complete series that were imperfect, has been continued. In the course of this work the Council have, upon the recommendation of the Library Committee, distributed some 1500 volumes, consisting partly of duplicates and partly of works of small scientific value, among various public institutions. The catalogue of the manuscripts, which I mentioned in my last year's address as about to be commenced, has been completed during the past session. The maps and charts, the pictures and busts, have also been catalogued; and the collection of the manuscripts of memoirs

in the 'Philosophical Transactions,' the 'Proceedings,' and the 'Archives,' having been completed, the binding of them is now going forward.

The Royal Society has always been ready to assist the Government of the day when requested so to do, by expressing its opinions or offering its advice on questions involving special scientific knowledge. Last year I received, as your President, a request from the President of the Board of Trade that I should, in conjunction with two Fellows of the Royal Society nominated by me in consultation with the Council, examine a report in two parts presented by the Corporation of the Trinity House to the Board of Trade, relative to Lighthouse Illuminants, and express our opinion whether the conclusions of the Trinity House, as set forth in their Reports, are justified by the records of the experiments contained therein. Lord Rayleigh and Sir William Thomson were asked, and consented, to join me as referees, and our Report was some time ago sent in to the Board of Trade, and is now in the hands of the public.

Another subject in which scientific principles are blended with practical application, is that of colour blindness in its relation to the correct perception of coloured signals used at sea and in the railway service. It is easy to understand what serious accidents might be occasioned, for instance, by confusing red with green; and so well is the liability to such confusion, arising from a not very rare abnormal condition of colour perception, understood at the present day, that persons who propose to engage in service at sea or on the railways are now, as a matter of course, examined as to their perception of colour. But, glaring as the difference between red and green appears to persons whose vision is normal, the detection of those who are liable to confound them, and who, for the most part, are quite unconscious that they see colours differently from people in general, is by no means so easy as it might appear at first sight; and there appeared reason to think that sometimes the tests applied are defective, and let pass persons who are afflicted with this peculiarity of vision, while, on the other hand, they may lead to the rejection of persons whose vision is normal, perhaps, after they have engaged as they hoped for life in an employment for which normal vision is demanded. Mr. R. Brudenell Carter wrote a letter to us suggesting that we should appoint a committee to investigate the subject of colour blindness, and after discussion of this proposal I was requested to write a letter to the President of the Board of Trade informing him that, should the Government desire it, the Council will be prepared to appoint a committee to consider the whole question of colour blindness. A reply was received from the Board thanking us for the communication, and saying that they regarded with satisfaction the proposal of the Council to appoint such a committee. A committee

has accordingly been appointed, and has held several meetings, and examined several witnesses; but the subject is a wide one, and the committee have not yet brought their labours to a close.

The proceedings of to-day bring to an end my long tenure of office in the Royal Society, which has extended now over thirty-six years, during the last five of which I have held the honourable office of your President. I am deeply sensible of the kindness which I have always experienced from the Fellows, and of the indulgence with which they have overlooked my deficiencies, due, in part, to the pressure of other work. It cannot be without a strong feeling of regret that I come to the close of an official connexion with the Society that has now extended over full half my life. But I feel that it is time that I should make way for others, and that I should not wait for those infirmities which advancing years so often bring in their train; besides which there are personal reasons which led me to request the members of the Council not to vote for my nomination for re-election as your President.

And now it only remains to me, as virtually my last official act as your President, to perform the pleasing duty of delivering the medals which the Society has to award to the respective recipients of those honours.

The Copley Medal has been awarded to our Foreign Member, Professor Simon Newcomb, who has been engaged during the last thirty years in a series of important researches, which have contributed greatly to the progress of gravitational astronomy. Among his labours in this field may be mentioned his able discussion of the mutual relations of the orbits of the Asteroids, with reference to Olbers' hypothesis, that they were formed by the breaking up of a ring of nebulous matter, his discussion of the orbits of Uranus and Neptune, and of the orbit of the Moon. Recently he has turned his attention to Saturn's satellites, and has investigated the remarkable action of Titan on Hyperion. For many years back he has chiefly been engaged in perfecting the tables of the Moon; and in his important work, "Researches on the Motion of the Moon," he has discussed observations of eclipses and occultations previous to 1750, with the important practical result that by the removal of an empirical term of long period from Hansen's lunar tables, and by an empirical alteration of another term of long period, he is enabled to represent satisfactorily the observations of the Moon from 1625 to the present time.

The Rumford Medal has been awarded to Professor H. Hertz for his work on Electro-magnetic Radiation.

One of the most remarkable achievements of the late Professor Clerk Maxwell was his electro-magnetic theory of light, in which it was shown that a certain velocity, determinable numerically by purely

electrical experiments, and expressing theoretically the velocity of propagation of an electro-magnetic disturbance, agreed within the limits of error of experiment with the known velocity of propagation of light; and accordingly that we have strong reason for believing that light is an electro-magnetic phenomenon, whatever the appropriate physical idea may hereafter prove to be which we ought to attach to the propagation of an electro-magnetic disturbance. But as yet no means existed by which phenomena, such as those of interference, which are bound up with the propagation of undulations, could be exhibited by purely electrical means. Professor Hertz was the first to detect electro-magnetic waves in free space by his invention of a suitable receiver, consisting of what may be called a resonating circuit, which gives visible sparks when immersed in a region of sufficiently intense electric radiation.

By reflection, refraction, and interference experiments, he has further verified the undulatory nature of the disturbance near a quick electric oscillator, such as had been suggested by Professor Fitzgerald, on the basis of Clerk Maxwell's electro-magnetic theory of light, and Sir W. Thomson's theory of the oscillatory character of a Leyden jar discharge.

These important researches contribute powerfully to the inducements we have to refer the phenomena of light and electricity to a common cause, different as hitherto their manifestations have been; and by this means the theory of each may be advanced through what we know of the other.

One of the Royal Medals has been awarded to our Fellow, Dr. David Ferrier, for his researches on the localisation of cerebral functions.

We owe to his experiments on monkeys, animals which he was the first to use for this purpose, the beginning and indeed the greater part of our knowledge of cerebral localisation in man. From pathological observations, Broca located the centre for speech in the third left frontal convolution, but with this exception nothing was known of cerebral localisation in man until Dr. Ferrier commenced his experiments in 1873.

Fritsch and Hitzig in 1870 had observed that definite movements could be obtained by electrical irritation of the cerebral cortex in the dog, and this indicated the existence of localised motor areas in the brain. They did nothing, however, towards localising sensory centres, and even in regard to the motor centres their observations were very limited. Their experiments, moreover, were confined to dogs, and it may be doubted whether any great or rapid advance would have been made had not Ferrier hit upon the happy device of experimenting upon monkeys, whose brains present a great similarity in the arrangement of the convolutions to those of man. By employing these

animals, he was able to map out the most important *motor* areas with great precision; but, not content with the investigation of motor centres, he experimented on the localisation of *sensory* centres in the brain, and not only showed the existence of such centres, but determined their position. And if in the numerous observations which have been subsequently made by other inquirers results somewhat differing from his own have been obtained, the main outlines of his conclusions have been confirmed. As so often happens, these researches, purely scientific in the first instance, have been turned to practical account. Dr. Ferrier himself predicted the application of cerebral localisation to cerebral surgery. This application others have already made, and his prediction is now being fulfilled with brilliant results.

The other Royal Medal has been awarded to our Fellow, Dr. John Hopkinson, for his researches in magnetism and electricity.

Dr. Hopkinson's researches in magnetism comprise investigations of the effect of temperature upon the magnetic properties of iron, nickel, and various alloys of these metals ('Phil. Trans.,' 1889, A, p. 443). It was known that for small magnetising forces the magnetisation of iron, nickel, and cobalt increases with increase of temperature until we approach a certain temperature, which may be called the critical temperature, on passing which the magnetism almost suddenly disappears. Dr. Hopkinson's experiments show that for small magnetising forces not only does the magnetisation increase with rise of temperature, but on approaching the critical temperature the increase becomes extremely rapid, and then, on still further increase of temperature, the magnetism suddenly almost entirely disappears. He has further determined the critical temperature for various samples of iron and steel. He has also measured the rapid change which takes place in the temperature coefficient of electrical resistance in the neighbourhood of the critical temperature, and has shown that, as had been conjectured, it is really at the critical temperature that the phenomenon of recalescence takes place.

Dr. Hopkinson's contributions to the theory of dynamo-electric machinery are most important. The method, now so extensively used, of solving problems relating to dynamos by the use of what M. Deprez has called the "characteristic curve," is due to him.

He has also made a series of determinations of the specific inductive capacities and refractive indices of a large number of transparent dielectrics, the results of which are of great importance in the theories of electricity and light.

The Davy Medal has been awarded to Professor Emil Fischer for his discoveries in organic chemistry, and especially for his researches on the carbo-hydrates.

To him, in conjunction with Otto Fischer, we owe the determina-

tion of the constitution of rosaniline, a most valuable dye-stuff, and the typical member of a very large group of important dyes.

He is the discoverer of phenylhydrazine, one of the most important of the reagents placed at chemists' disposal within recent years, and he has most exhaustively studied the behaviour of this substance and its congeners. The hydrazines have also been employed by Fischer in preparing indole derivatives, among others, skatole, and the study of a class of substances of considerable physiological importance has thereby been rendered possible.

During the past seven years Fischer has devoted his attention to the study of the sugars, and has obtained most marvellous results, having succeeded in preparing, by purely artificial methods, the known sugars dextrose and levulose, as well as other isomeric sugars, and having established the relationship of the various members of the glucose group. He has, in addition, determined the constitution of milk-sugar and of starch-sugar—the isomer of cane-sugar formed on hydrolysing starch. He has also prepared "glucoses" containing seven, eight, and nine atoms of carbon, and has established the remarkable fact that only those which contain three, six, or nine atoms of carbon are fermentable by yeast. His researches are not only of the highest value to chemists, but also of extreme importance to physiologists, on account of the insight which they promise into the processes concerned in the natural formation of sugars.

The Darwin Medal has been awarded to Mr. Alfred Russel Wallace for his independent origination of the theory of the origin of species by natural selection.

It was natural that this, the first, award of the Darwin Medal should have been made to one who independently originated the theory, since named that of natural selection, which, in conjunction with his other numerous and important contributions in the domain of natural history, has made the name of Darwin so famous, and who made known a large series of important and novel observations in support of that theory, the result of many years' work in the Malay Archipelago. These views Mr. Wallace has subsequently most ably advocated in various published works, among others his laborious volumes on the 'Geographical Distribution of Animals,' his brilliant 'Island Life,' and more recently his 'Darwinism,' which was published only last year.

The Statutes relating to the election of Council and Officers were then read, and Mr. Common and Mr. Symons having been, with the consent of the Society, nominated Scrutators, the votes of the Fellows present were taken, and the following were declared duly elected as Council and Officers for the ensuing year:—

President.—Sir William Thomson, D.C.L., LL.D.

Treasurer.—John Evans, D.C.L., LL.D.

Secretaries.— { Professor Michael Foster, M.A., M.D.
The Lord Rayleigh, M.A., D.C.L.

Foreign Secretary.—Archibald Geikie, LL.D.

Other Members of the Council.

Professor William Edward Ayrton; William Henry Mahoney Christie, M.A.; Professor W. Boyd Dawkins, M.A.; James Whitbread Lee Glaisher, D.Sc.; Hugo Müller, Ph.D.; Professor Alfred Newton, M.A.; Sir William Roberts, M.D.; William Chandler Roberts-Austen, F.C.S.; Professor Edward Albert Schäfer, M.R.C.S.; Sir George Gabriel Stokes, Bart, M.A.; Lieut.-General Richard Strachey, R.E.; Professor Joseph John Thomson, M.A.; Professor Thomas Edward Thorpe, B.Sc.; Sir William Turner, M.D.; Professor Sydney Howard Vines, M.A.; General James Thomas Walker, C.B.

The thanks of the Society were given to the Scrutators.

Balance Sheet. 1890.

Statement of Receipts and Expenditure from November 12th, 1889, *to November* 12th, 1890.

	£	*s.*	*d.*	£	*s.*	*d.*
To Balance at Bank, 12th November, 1889				94	7	3
„ Balance in hand, Catalogue Account	2	17	7	10	11	11
„ „ „ Petty Cash	7	14	4			
„ Annual Contributions, 148 at £4	592	0	0	1,045	0	0
„ 151 at £3	453	0	0			
„ Fee Reduction Fund, in lieu of Admission Fees and Annual Contributions				301	0	0
„ Rents:						
Fee Farm, Lewes	18	14	5	103	14	5
Mablethorpe Estate	85	0	0			
„ Ground Rents				588	18	9
„ Dividends (exclusive of Trust Funds)				2,032	9	9
„ Interest on Mortgage Loan				585	0	0
„ Sale of Transactions and Proceedings				653	18	6
„ Sale of Catalogue				5	5	0
„ Sale of Krakatoa Report (leaving £94 17*s.* 3*d.* Expenditure in excess of Receipts)				8	5	0
„ Transfer from Handley Fund on account of Catalogue				187	2	4
„ Compositions				180	0	0
„ Lendenfeld Monograph, Sales	£10	5	0	210	5	0
„ Contribution from Australian Museum, Sydney	200	0	0			
„ Challenger Report, Government Grant				1,600	0	0
„ Law Costs refunded *re* Lawes Trust				59	11	11
				£7,665	9	10

	£	*s.*	*d.*	£	*s.*	*d.*
By Salaries, Wages, and Pension				1,755	12	0
„ Catalogue of Scientific Papers				156	11	0
„ Books for the Library				245	7	7
„ Printing and Advertising Transactions, and Separate Copies to Authors and Publisher	183	10	1	2,196	16	2
„ Ditto Proceedings, Nos. 280 to 294	826	13	3			
„ Ditto Miscellaneous	115	19	0			
„ Paper for Transactions and Proceedings	344	5	9			
„ Binding ditto	43	14	0			
„ Engraving and Lithography	682	14	1			
„ Scirée and Reception Expenses				161	7	2
„ Coal, Lighting, &c.	185	1	9	648	12	6
„ Office Expenses	45	0	1			
„ House Expenses	186	11	5			
„ Tea Expenses	19	13	8			
„ Fire Insurance	55	5	0			
„ Taxes	44	12	6			
„ Advertising	17	17	0			
„ Postage, Parcels, and Petty Charges	64	10	0			
„ Miscellaneous Expenses	30	1	1			
„ Lendenfeld Monograph (making with previous Expenditure £682 6*s.* 9*d.* in excess of Receipts)				16	9	2
„ Krakatoa Report				2	10	0
„ Carrington Donation				37	10	0
„ Challenger Report, payment to Mr. J. Murray				600	0	0
„ Electric Lighting, Plant, &c.				65	6	4
„ Balance at Bankers				1,753	9	5
„ Balance on hand, Catalogue Account	£2	15	1	25	18	6
„ Ditto, Petty Cash	23	3	5			
				£7,665	9	10

Trust Funds.

	£	s.	d.	£	s.	d.
To Balance at Bank 12th November, 1889:—						
General Account	1,171	18	7			
Fee Reduction Fund Account	198	18	8	2,141	10	7
Scientific Relief Fund Account	770	13	4			
„ Scientific Relief Fund, Dividends, and Donations	653	12	2			
„ Donation Fund, Dividends, and Transfer from Jodrell Fund	389	11	6			
„ Rumford Fund, Dividends	62	8	1			
„ Bakerian and Copley Medal Fund, Dividends, &c.	54	10	0			
„ Keck Bequest, Dividends	23	8	0			
„ Wintringham Fund, Dividends, &c.	32	4	0			
„ Croonian Lecture Fund—Rent	50	9	8	4,875	1	0
„ Davy Medal Fund, Dividends	32	3	6			
„ Gassiot Trust, Dividends, &c.	967	13	5			
„ Handley Fund, Dividends	187	2	4			
„ Jodrell Fund, Dividends	138	19	4			
„ Fee Reduction Fund, Dividends	421	8	11			
„ Darwin Memorial Fund, Dividends	85	16	0			
„ Joule Memorial Fund, Subscriptions and Dividends	1,775	14	1			
				£7,016	11	7

	£	s.	d.	£	s.	d.
By Scientific Relief Fund, Grants	692	0	0			
„ Donation Fund, Grants	150	10	0			
„ Rumford Fund, Purchase of Consols	6	18	2			
„ Bakerian and Copley Medal Fund, Medal, and Gift	54	12	0			
„ Keck Bequest, Payment to Foreign Secretary	23	8	0			
„ Wintringham Fund, Payment to Foundling Hospital	42	8	6			
„ Croonian Lecture Fund, Payment	50	9	8			
„ Davy Medal Fund, Gold Medals	32	4	6			
„ Gassiot Trust, Payments to Kew Committee	487	10	0	4,457	7	8
„ Ditto, Investment	442	10	6			
„ Handley Fund, Transfer to General Account	187	2	4			
„ Jodrell Fund, Transfer to Donation Fund	138	19	4			
„ FeeReduction Fund, Investment. .	225	15	6			
„ Ditto, Transfer to Royal Society General Account (1890)	301	0	0			
„ Darwin Memorial Fund, Expenses	0	9	0			
„ Joule Memorial Fund, Payments and Investments	1,621	10	2			
„ Balance at Bankers:—						
General Account	1,579	2	5			
Fee Reduction Fund Account	93	12	1	2,559	3	11
Scientific Relief Fund Account	732	5	6			
Joule Memorial Fund Account	154	3	11			
				£7,016	11	7

Estates and Property of the Royal Society, including Trust Funds.

Estate at Mablethorpe, Lincolnshire (55A. 2R. 2P.), rent £100 per annum.

Ground Rent of House, No. 57, Basinghall Street, rent £380 per annum.

„ „ of 23 houses in Wharton Road, West Kensington, rents £253 per annum.

Fee Farm Rent, near Lewes, Sussex, £19 4*s.* per annum.

One-fifth of the clear rent of an estate at Lambeth Hill, from the College of Physicians, about £52 per annum, Croonian Lecture Fund.

Stevenson Bequest. Chancery Dividend. One-fourth annual interest on Bank Stock and other Securities (produced £661 9*s.* 5*d.* in 1889-90).

The Funds in Court now standing to the credit of the cause are as follows:—

£11,000 Bank Stock.
£11,031 London and North Western Railway Consolidated 4 per Cent. Guaranteed Stock.
£11,105 Great Northern Railway 4 per Cent. Perpetual Preference Stock.
£11,031 North Eastern Railway Consolidated 4 per Cent. Guaranteed Stock.
£8,894 Great Western Railway 5 per Cent. Consolidated Guaranteed Stock.
£11,035 16*s.* 5*d.* Midland Railway 4 per Cent. Consolidated Preference Stock.

Subject to certain charges, the Royal Society is entitled to one-fourth of the proceeds.

£15,000 Mortgage Loan, 4 per Cent., about to be paid off.

£14,297 8*s.* 5*d.*, 2¾ per Cent. Consolidated Stock, being £10,779 8*s.* 2*d.* on account of the following Funds:—

	£	*s.*	*d.*
Rumford Fund	2,330	0	0
Wintringham Fund	1,200	0	0
Gassiot Trust	400	0	0
Sir J. Copley Fund	1,666	13	4
Jodrell Fund	5,182	14	10

and £3,518 0*s.* 3*d.* in Chancery, arising from sale of the Coleman Street Estate.—General Purposes.

£403 9*s.* 8*d.* New 2½ per Cent. Stock.—Bakerian and Copley Medal Fund.

£1,000 India 3½ per Cent. Stock.—General Purposes.

£800 Midland Railway 3 per Cent. Debenture Stock.—Keck Bequest.

£5,660 Madras Railway Guaranteed 5 per Cent. Stock { General Purposes, £5,000. / Davy Medal Fund, £660.

£10,000 Italian Irrigation Bonds.—The Gassiot Trust.

£6,396 Great Northern Railway 4 per Cent. Debenture Stock { Scientific Relief Fund, £5,000. / The Trevelyan Bequest, £1,396.

£5,030 Great Northern Railway Perpetual 4 per Cent. Guaranteed Stock.—Donation Fund.

£4,400 Metropolitan 3½ per Cent. Stock.—Fee Reduction Fund.

£7,000 London and North Western Railway 4 per Cent. Perpetual Debenture Stock.—Fee Reduction Fund.

£18,150 „ „ „ „ 4 per Cent. Consolidated Guaranteed Stock.— { £6,000 Scientific Relief Fund. / £12,150 General Purposes.

£5,000 London and North Western Railway Consolidated 4 per Cent. Preference Stock.—General Purposes.

£5,000 North Eastern Railway 4 per Cent. Preference Stock.—General Purposes.

£2,200 South Eastern Railway 4 per Cent. Debenture Stock.—Darwin Memorial Fund.

£4,340 South Eastern Railway 5 per Cent. Debenture Stock.—Scientific Relief Fund.

£3,333 London and South Western Railway 4 per Cent. Preference Stock.—General Purposes.

£4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock.—Handley Fund.

£1,000 Policy in the Atlas Assurance Office, becoming due October 7th, 1899.—Catalogue Account.

£800 London, Brighton, and South Coast Railway Consolidated Guaranteed 5 per Cent. Stock.—Joule Memorial Fund.

JOHN EVANS, *Treasurer.*

We, the Auditors of the Treasurer's Accounts on the part of Council, have examined these Accounts and found them correct.

HUGO MÜLLER.
EDWARD J. ROUTH.

We, the Auditors of the Treasurer's Accounts on the part of the Society have examined these Accounts and found them correct.

JAMES COCKLE.
A. AINSLIE COMMON.
G. CAREY FOSTER.
JOHN RAE.

Trust Funds. 1890.

Scientific Relief Fund.

£6,000 L. & N.W.R. 4 per Cent. Consolidated Guaranteed Stock.
£5,000 Great Northern Railway 4 per Cent. Debenture Stock.
£4,340 South Eastern Railway 5 per Cent. Debenture Stock.

Dr. *Cr.*

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Balance { Income	801 4 7		By Grants		692 0 0
Less — Capital over-invested	30 11 3	770 13 4	„ Balance, Income £756 15 9		
„ Dividends		640 11 6	„ Less—Capital over-invested 24 10 3		732 5 6
„ Annual Subscriptions		6 1 0			
„ Interest on Deposit		6 19 8			
		£1,424 5 6			£1,424 5 6

Donation Fund.

£5,030 Great Northern Railway Perpetual 4 per Cent. Guaranteed Stock.
The Trevelyan Bequest. £1,396 Great Northern Railway 4 per Cent. Debenture Stock.

	£ s. d.		£ s. d.
To Balance	550 10 11	By Grants	150 10 0
„ Dividends	250 12 2	„ Balance	789 12 5
„ Transfer from Jodrell Fund	138 19 4		
	£940 2 5		£940 2 5

Rumford Fund.

£2,330 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	87	8	2	By Purchase of £7 1*s.* 0*d.* 2¾ per Cent. Stock	6	18	2
„ Dividends	62	8	1	„ Balance	142	18	1
	£149	16	3		£149	16	3

Bakerian and Copley Medal Fund.

Sir Joseph Copley's Gift, £1,666 13*s.* 4*d.* 2¾ per Cent. Consolidated Stock.
£403 9*s.* 8*d.* New 2½ per Cent. Stock.

	£	s.	d.		£	s.	d.
To Balance	119	4	6	By Gold Medal	4	12	0
„ Dividends, New 2½ per Cent. Stock	9	16	8	„ Rev. Dr. Salmon—Sir J. Copley's Gift	50	0	0
„ Dividend—Sir J. Copley's Fund	44	13	4	„ Balance	119	2	6
	£173	14	6		£173	14	6

The Keck Bequest.

£800 Midland Railway 3 per Cent. Debenture Stock.

	£	s.	d.		£	s.	d.
To Dividends	23	8	0	By Payment to Foreign Secretary	23	8	0

Wintringham Fund.

£1,200 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	42	8	6	By Payment to Foundling Hospital	42	8	6
„ Dividends	32	4	0	„ Balance	32	4	0
	£74	12	6		£74	12	6

Croonian Lecture Fund.

One-fifth of the clear rent of an Estate at Lambeth Hill, from the College of Physicians, about £52 per annum.

	£	s.	d.		£	s.	d.
To Rent	50	9	8	By Lecture—Dr. E. Roux	50	9	8

Davy Medal Fund.

£660 Madras Railway Guaranteed 5 per Cent. Stock.

	£	s.	d.		£	s.	d.
To Balance	77	0	1	By Gold Medals	32	4	6
„ Dividends	32	3	6	„ Balance	76	19	1
	£109	3	7		£109	3	7

The Gassiot Trust.

£10,000 Italian Irrigation Bonds.

£400 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Balance	14	8	11	By Payments to Kew Committee	487	10	0
„ Dividends	498	4	8	„ Purchase of £400 Italian Irrigation Bonds	442	10	6
„ £400 Italian Irrigation Bonds drawn	469	8	9	„ Balance	52	1	10
	£982	2	4		£982	2	4

Handley Fund.

£4,798 Lancashire and Yorkshire Railway 4 per Cent. Guaranteed Stock.

	£	s.	d.		£	s.	d.
To Dividends	187	2	4	By Transfer to Catalogue Account	187	2	4

The Jodrell Fund.

£5,182 14*s.* 10*d.* 2¾ per Cent. Consolidated Stock.

	£	s.	d.		£	s.	d.
To Dividends	138	19	4	By Transfer to Donation Fund	138	19	4

Fee Reduction Fund.

£4,400 Metropolitan 3½ per Cent. Stock.
£7,000 London and North Western Railway 4 per Cent. Perpetual Debenture Stock.

	£	s.	d.		£	s.	d.
To Balance	198	18	8	By Transfer to Royal Society General Account	301	0	0
„ Dividends	421	8	11	„ Purchase of £200 Metropolitan 3½ per Cent. Stock	225	15	6
				„ Balance	93	12	1
	£620	7	7		£620	7	7

Darwin Memorial Fund.

£2,200 South Eastern Railway 4 per Cent. Debenture Stock.

	£	s.	d.		£	s.	d.
To Balance	280	17	6	By Printing	0	9	0
„ Dividends	85	16	0	„ Balance	366	4	6
	£366	13	6		£366	13	6

Joule Memorial Fund.

£800 London, Brighton, and South Coast Railway Consolidated Guaranteed 5 per Cent. Stock.

	£	s.	d.		£	s.	d.
To Subscriptions	1,754	7	3	By Purchase of £800 L. B. & S. C. R. Stock	1,278	19	6
„ Interest on Deposit	1	16	10	„ Expenses	42	10	8
„ Dividend	19	10	0	„ On Deposit on behalf of the Committee	300	0	0
				„ Balance	154	3	11
	£1,775	14	1		£1,775	14	1

The following Table shows the progress and present state of the Society with respect to the number of Fellows :—

	Patron and Royal.	Foreign.	Compounders.	£4 yearly.	£3 yearly.	Total.
Nov. 30, 1889 ..	5	47	176	151	139	518
Since Elected ..	..	+ 3	+ 3	..	+ 12	+ 18
Since Deceased ..	..	— 1	— 11	— 5	— 1	— 18
Defaulter ..	..	..	..	— 1	..	— 1
Dec. 1, 1890 ..	5	49	168	145	150	517

Account of the appropriation of the sum of £4,000 (the Government Grant) annually voted by Parliament to the Royal Society, to be employed in aiding the advancement of Science (continued from Vol. XLVI, p. 469).

1889–1890.

	£
E. Nevill, for continuing his Deduction of the Corrections to the Theory embodied in Hansen's Lunar Tables	50
P. Smyth, for further Researches in Spectroscopic Measurement of Ultra Definition and Extreme Separation	100
J. N. Lockyer, for Astrophysical Observations, including Long Exposure Photographs of the Spectra of Nebulæ with Comparison Spectra	125
G. Higgs, for the Production by means of Photography of a Map of a Normal Solar Spectrum from w. l. 3,000 to 10,000..	50
C. Davison, for the Preparation of the Bibliography of Seismology (1800–83)	10
A. M. Worthington, for an Investigation of the Relation between Tensional Stress and Strain in Liquids	40
Dr. J. W. Tripe, for further Aid in Providing Assistance for the Discussion of Observation of Thunderstorms in 1888–89	30
Prof. W. Ramsay, for an Investigation of the Ratio between the Specific Heat at Constant Volume and at Constant Pressure of (primarily) Ether-gas	60
Carried forward	£465

	£
Brought forward	465
J. I. Plummer, for Reducing and Publishing Observations of Eight Comets and for further Observations	50
Profs. Rücker and Thorpe, for a further Magnetic Survey of the United Kingdom	600
Colour-vision Committee of the Royal Society	100
J. B. Cohen, for a Research on the Constitution of the Compounds of Ammonia with Sulphuretted Hydrogen	50
W. H. Perkin, jun., for further Research on the Constitution of the Alkaloid Berberin.....	50
F. R. Japp, for an Investigation of the Reactions of Ketones, Diketones, and Allied Compounds	75
G. J. Burch and J. E. Marsh, for Continuation of their Researches on Amine Vapours.....	50
A. Smith, for a Research on the Synthesis and Properties of 1 : 3- and 1 : 4-Diketones.....	10
S. Pickering, for an Investigation on the Nature of Solutions, and the Law of the Freezing Points of Solutions.....	50
Dr. F. S. Kipping, for an Investigation of the Action of Phosphoric Anhydride on Fatty Acids	25
A. P. Laurie, for Continuation of Researches on the Composition of Alloys	40
Prof. W. R. Dunstan, for further Investigation of the Connexion between the Chemical Constitution of certain Organic Nitrites and their Physiological Action.....	50
Dr. C. R. A. Wright, for further Researches on Ternary Alloys	50
T. R. Marshall, for a Research on the Constitution of Diacetyl Tetramethylene Carboxylic Acid, and three other Researches	15
S. Ruhemann, for a Research on Mucic and Saccharic Acids	20
G. S. Turpin, for a Research on the Ignition of Explosive Gaseous Mixtures	50
H. Gordon, for an Investigation of the Question whether Direct Isomeric Change of Meta- into Para-compounds, or of Ortho- into Meta-compounds, is possible in the Benzine Series	20
Prof. Armstrong, for the Study of Naphthalene Derivatives with the object of determining the Laws which govern the Formation of Substitution Derivatives of Benzenoid Hydrocarbons	100
P. J. Hartog, for the Completion of a Thermochemical Research on the Sulphides	50
Carried forward.....	£1,920

	£
Brought forward	1,920
W. C. Williamson, for further Research on the Organisation of the Fossil Plants of the Coal-measures	50
R. Kidston, for a Research on the Vertical and Horizontal Distribution of British Palæozoic Flora	40
Scientific Committee, Royal Horticultural Society (per D. Morris), for an Inquiry into the Composition of London Fog, with special regard to the Constituents of Fog injurious to Plant-life	100
Dr. G. H. Fowler, for Researches connected with the Bionomics of certain Lower Crustacea	150
Prof. J. R. Green, for Continuation of Researches into the Processes of Germination in Plants	30
T. Johnson, for further Investigation of Obscure or Unknown Points in the Florideæ	25
F. E. Beddard, for a Research on the Structure of the Oligochæta	50
E. R. Lankester, for further Investigation of Larval Development of Amphioxus	100
G. Massee, to prepare a Monograph of the Myxogastres, and to investigate the Life-history of Typical Members of the Group	50
Liverpool Marine Biological Committee (per Prof. Herdman), for the further Exploration of the Fauna and Flora of Liverpool Bay	50
W. Heape, for an Investigation of the Phenomena of Menstruation and Ovulation, and of the Early Stages of Development of the Monkey	100
West Indies Committee (per D. Morris), for further Aid in Collecting and Describing Fauna and Flora in the less known West India Islands	100
R. Irvine, for a Research on (1) the Solvent Power of Sea-water upon Carbonate of Lime; (2) the Secretion of Silica...	100
J. T. Cunningham, for a Month in Norway to get Developing Eggs of *Myxine glutinosa*	40
E. A. Schäfer, for Continued Investigations into the Functions of the Brain of Monkeys	100
W. Hale White, for further Investigation of the Effect upon Bodily Temperature of Lesions of the Corpus Striatum and Optic Thalamus	50
Prof. P. F. Frankland, for further Study of the Chemical Changes induced by Specific Micro-organisms	50
Carried forward.....	£3,105

	£
Brought forward.....	3,105
W. MacLennan, for an Experimental Investigation into all the Known and Isolated Alkaloids of Opium.....	15
W. D. Halliburton, for further Researches on the Chemical Physiology of the Animal Tissues.....	50
Dr. J. R. Bradford, for a further Investigation into the Functions of the Kidney.....	75
Dr. Lingard, for further Researches as to the Relation existing between the Fœtus and its Mother	40
Drs. Gulland, Edington, and Ritchie, for the Purchase of two High-power Objectives for Research Purposes.....	50
Prof. Tait, for Aid in an Investigation on the Duration of Impact.....	30
W. T. Thiselton Dyer, to enable Mr. Gustav Mann to accompany, as Botanist, the Delimitation Commission in Sierra Leone	100
J. B. Farmer, to enable him to Proceed to Ceylon to Study the Morphology of the Hepaticæ.....	100
	£3,565

Dr.

	£	*s.*	*d.*
To Balance, November 30, 1889 .	61	2	4
,, Grant from Treasury	4,000	0	0
,, Repayments	33	1	9
,, Interest on Deposit.....	36	1	10
	£4,130	5	11

Cr.

	£	*s.*	*d.*
By Appropriations, as above.....	3,565	0	0
,, Salaries, Printing, Postage, Advertising, and other Administrative Expenses	104	7	3
,, Balance, Nov. 30, 1890	460	18	8
	£4,130	5	11

Account of Grants from the Donation Fund in 1889–90.

	£	*s.*	*d.*
Prof. Schäfer, to assist Messrs. Bradford and Dean in a Research on the Vasomotor Nerves of the Pulmonary Vessels	15	0	0
Prof. G. H. Darwin, towards the Payment of Computers for the Reduction of his Tidal Observations	25	0	0
The Astronomer Royal, to assist Mr. Downing in Computing the Orbit of the Minor Planet Juno	10	10	0
G. J. Symons, in Aid of Expenses connected with the construction of his Brontometer	100	0	0
	£150	10	0